



DEPARTMENT OF PUBLIC WORKS • ENGINEERING DIVISION  
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## IMPROVEMENT PLAN CHECKLIST

### STREET AND STORM DRAIN IMPROVEMENTS

Street and Storm Drain Plan  
Sheet 1 of 4

PROJECT: \_\_\_\_\_ Checked by: \_\_\_\_\_

Date: \_\_\_\_\_

This checklist should be considered as a guideline with acceptable minimums to be used for plan preparation by private engineers. Other methods of achieving the desired result can be used and are encouraged.

1. Plan Check BASE FEE ONLY required when plans submitted. Totaled bond estimate and complete hydrology study required with first check. Balance due on plan check fee will be calculated by plan checker and collected prior to final plan approval.
2. Plans to be approved by engineer. His name, address, phone number and registration number to appear. The plans shall also bear the seal or stamp of the engineer and the expiration date of the certificate or authority.
3. Does the engineer have a current City business license? City of Riverside Business Tax Certificate number and expiration date to appear on plan. City case or project number required in title block. For building permits, show address of lot.
4. North arrow and vicinity map.
5. Names of streets checked against the final map. Street name sign schedule and construction notes.
6. Check case file for Planning commission or City Council Requirements.
7. Scale. Show both horizontal and vertical scales.
8. Show bearings on all streets shown. Radial bearings on centerline of all catch basins, etc., in a curve.
9. Stationing to conform to established stationing on approved City plans. Stationing to be left to right. On new streets, use 0+00 or 10+00 at intersections and increase stationing from that point, left to right. No negative stationing. If you have any questions or problems regarding stationing, contact Public Works, Land Development Section prior to design.
10. Check stationing and elevations on consecutive sheets. If more than one sheet, show match lines at identical points on consecutive sheets. Give references to other sheets.
11. Show stationing of all BCRs and ECRs, B.C.s and E.C.s of all curves.
12. Show stations at beginning and end of improvements and at center of catch basins, etc.
13. Show Centerline curve data, and also short and long side for curbed sections.
14. Minimum 200' centerline radius on residential streets unless prior approval from Public Works is obtained.
15. 35' curb return radii at street intersections with secondary or major streets. All others 27'. Wheelchair ramps required at all curb returns except in knuckles.
16. Show curb return data (delta, tangent, radius and length).
17. Show right-of-way and improvement widths (parcel to be improved, adjoining parcels and parcels across the street.)
18. Show lot lines and lot numbers same as on record map.

19. Show existing improvements with dashed lines (see Std. Dwg. No. 1), along with dimensions and plan references. Show existing adjacent driveways and topo in and adjacent to area of proposed construction.
20. Show existing pipelines, irrigation lines, structures, power poles, trees, etc., in right-of-way and include note as to their disposition if encroaching. Label with size, etc., and distance from centerline. See Std. Dwg. No. 1 for correct symbols. Show existing underground structures that may conflict with, or enter into, the design of proposed improvements. Private engineer to have owner or department controlling utility sign plans after second check if utility is affected in any way.
21. Show improvements to be constructed with solid lines. Note connections to existing improvements.
22. Show details, dimensions, etc., of all improvements if not City standard. For all standard improvements, show standard drawing number. Check standard drawings for those dimensions to be shown on the plans.
23. If both 6" and 8" curb and gutter is being used, show limits on plan for each type and transition. 8" curb face to be used only if necessary for drainage. Use 8" curb face for medians. Curb only may be used for medians if drainage is away from median.
24. Check general and construction notes against "Sample General Notes." Show construction notes wherever necessary to clarify construction details.
25. Show length and location of transitions or super elevations, if used; also of transitional paves sections for drainage.
26. Show limits of new paving, old paving, overlay and removal. Use appropriate shading to delineate areas. See Std. Dwg. No. 3 for shading standards. On match-up paving situations where no new streets are being created, and on unpaved existing streets, an R-Value test or information from the Land Development section to determine the paving section is required prior to the plans being approved.
27. Curb-type sidewalk standard. If property line sidewalk is existing within block, continue property line sidewalk to street intersection and transition through return to curb-type sidewalk. Minimum 4' clearance required around any obstacle (tree wells, power poles, fire hydrants, etc.).
28. Show detail of cross gutter if not standard. Cross gutter and aprons to show direction of flow by arrows. Show flowline elevations along flowline of cross gutter.
29. Show T.C. and Flowline elevations on all BCRs and ECRs.
30. If cross gutter has upstream drainage area greater than 1,000 feet in length, then 10' cross gutter required. Otherwise, 6' width. Show width on plans.
31. No mid-block cross gutters. Cross gutters across major streets need prior approval from Public Works.
32. Show typical sections for all streets. Show existing, proposed and ultimate conditions. Show right and left sides of section as they would appear looking upstation on the street, even if only one side of the street is being improved. Identify property lines. Give level line offsets from centerline to T.C. Show range of slopes on existing and match-up paving. If difference in elevation between top of curb and existing ground at property line exceeds one foot, indicate what slopes are to be constructed outside the right-of-way, 1.5:1 cut, 2:1 fill, maximum. Maximum 2:1 slope within street right-of-way.
33. Cross slopes to be in the range of 1-2% for driving lanes and 3-4% for shoulders. 2% driving lane and 6% shoulder absolute maximums. Cross slopes to be computed from lip of gutter.
34. Show traffic index (T.I.) under typical sections. Residential T.I. = 5.0; Secondary T.I. = 7.0; Major T.I. – check with Public Works Department.
35. Standard 180 barricade needed at temporary dead end streets.
36. Incoming flare at 2:1, outgoing flare at 5:1, each from the curb face. F-1 flexible delineators, 20' on centers along outgoing taper.
37. 2" x 4" redwood headers required at edges of paving that are not adjacent to gutters or existing paving, except for the 2:1 and 5:1 tapers.
38. On "T" intersections, handicapped ramp required.

39. Block walls connected with backup lot treatment will be placed at the top of any slopes adjacent to the street. Backup walls to be in the City right-of-way. Details of other than standard 704 walls required on plans with note as to which City department is to inspect the construction of the wall, either Public Works or Building Division. Maximum height of wall; 6'. All footings to be designed for 6' walls. Show height of wall on plan.
40. Check for existing sewer lateral and show and label any proposed or existing laterals. (Applies to projects where there are existing sewers.) Laterals to be built before paving.
41. On curb type entrances on PRD's on major streets, special median may be needed in private street for traffic flow.
42. Slope letter needed if cut or fill at end or side of subdivision street adjacent to subdivision boundary exceeds one foot onto private property.
43. Alley approaches, which drain a portion of an alley with a valley gutter, will be depressed at the rear of the approach. Show elevation on plans.
44. Minimum 20' long x 2' wide x 2½" thick A.C. drainage aprons required at downstream end of stub streets.
45. "10-day" Letters to be sent to all adjacent property owners after first check corrections have been made.
46. Private engineer to have Parks Department initial all plans after the R-No. (Dwg. No.) is assigned.
47. Private engineer to have Planning Department initial all plans showing public block walls and landscaping.
48. Plan checker to make a field inspection of the site of the proposed improvements, if necessary.
49. Show flow around tract on index map on title sheet, if necessary.
50. If flow is diverted from its existing course onto private property, a recorded drainage release letter from the affected property owner will be required.
51. Private engineer to use Riverside County Flood Control calculation forms for drainage calculations (hydrology and HGL). Assume ultimate upstream development (C=0.7, Residential, C=0.9, Commercial/Industrial).
52. Check to see if new street section will carry same flow s existing street section (critical where there is an existing ditch along street) without diverting flow across centerline.
53.  $n = 0.020$  on residential streets (streets with driveways, parked cars, etc.)  $n = 0.015$  on major streets (no driveways, little or no parking).
54. Check structural calculations on nonstandard box culverts, etc., submitted by engineer.
55. Check drainage structures for capacity. Check hydraulic calculations submitted by engineer.
56. Note size, length, "D" strength and class of bedding for pipe. Minimum diameter of pipe 15".
57. Permanent drainage to be in the following preference:
  1. Storm drain pipe (RCP and CIPP).
  2. Gunite or similar open channel.
58. Sump catch basins to be designed for 50-year storm, underground storm drain systems designed for 10-year storm and open channel for 100-year storm. Sump conditions require a secondary overland freeflow to prevent flooding of buildings should catch basin or storm drain system become blocked.
59. 10-year storm to be carried between curbs and 100-year storm between right-of-way lines.
60. No grate catch basins with grates running parallel with curb.
61. No cross gutters where there are existing storm drains to tie into.
62. A recorded drainage release letter needed if streets drain onto adjacent property owner's land.
63. Letter to be written to the Department of Real Estate about any possible flooding of lots on tract, lots that have natural water courses through them, etc.
64. Any block walls, ditches, etc., needed along tract boundary to prevent flooding (overland from canals, etc.)? Show on plans.
65. Check at subdivision boundaries for any possible problems, such as blocking drainage from or discharging drainage to adjacent land or conflict with existing or proposed improvements.
66. Check for possible ponding on streets and cross gutters and aprons.

67. Show HGL and elevation of HGL to nearest 0.1' in profile. Show "Q" in streets, into catch basins and into storm drain system and designate Q10, Q50, etc. Show time of concentration at catch basins, junction structures, etc.
68. Water surface elevations in catch basins minimum 6" below gutter flowline.
69. If alternate of CIPP is shown on plan, show HGL for both RCP (n=0.013) and CIPP (n=0.013) and specify alternate size. CIPP concrete strength to be minimum 3250 psi.
70. Check for cutoff walls, energy dissipators, etc., at outlets of storm drain systems. Also, headwalls, etc., at inlets. Trash racks shall be provided at inlets where drainage from open areas enter storm drains.
71. No storm drain easements centered on property line and no storm drains located on property line. Minimum width storm drain easement 12'. Supplemental access easements may be required.
72. Encroachment permit needed from Riverside County Flood Control if connecting into one of their storm drains. City to apply with date and fee provided by private engineer.
73. Label private drainage system as such. Inlets of private drainage systems to be equal to or above HGL of public storm drain they connect to or, if tying into a catch basin, equal to or above the top of curb of the catch basin.
74. Standard APWA151-1 under-sidewalk drains to be used for private drainage only
75. If the proposed construction involves alteration of or discharge into a stream that is shown as a blue line or broken blue line on the USGS Quad Maps, the developer or developer's engineer shall file a notification form FG 2023 (form and fee schedule available from Land Development Section) with Department of Fish and Game Environmental Services, 3030 Golden Shore, Suite 50, Long Beach CA 90802 (Phone No. 310-590-5137). A copy of the notification shall be submitted to the Land Development Section.
76. If proposed construction will affect adjacent driveways in any way, a written O.K. from adjacent property owner(s) is required.
77. When proposed street improvements involve a railroad crossing in any way, engineer to contact Public Works to discuss design or street prior to submitting plans for checking.
78. If project conditions require fencing, construction limits of required chain link fence, etc., to be shown on plans.
79. On all major street intersections (2 or more major streets) 88' wide and greater, traffic signal conduit and pullboxes shall be shown on the plans even if no signals are being built at this time.
80. Plans shall have Dig-Alert stamp, if necessary, on each sheet so that the contractor must notify Underground Service Alert (USA) before digging or excavating.
81. Plans should be mylar. No stick-ons accepted. If engineer uses stick-ons on his original, he shall make a direct positive mylar for submittal to the City prior to approval.
82. Catch basins shall be stenciled with the phrase "No Dumping – Only Rain in the Drain."

FOR INFORMATION ONLY: Balance due on plan check fee must be paid prior to plan approval by Public Works Department. Also, if R/W is required for the project, plans will not be approved until deeds are in and sent for recording.

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Street and Storm Drain Profile  
Sheet 1 of 2

1. Show datum elevation at both ends of each sheet. Show bench mark reference on each sheet.
2. Show stationing at bottom of profile.
3. Show names and stationing of intersecting streets.
4. Label and show stations and elevations at the beginning and end of all curb returns, vertical curves, horizontal curves, transition sections, grade breaks and beginning and end of improvements.
5. Indicate length of curb returns and length of horizontal curves. Draw curb returns full length, not twice tangent distance.
6. Curb returns to be designed by plane method on top of curb.  $\Delta/4$  points to be shown on all returns with elevations. Show P.I. elevation. Show tangent grades, if different from T.C. grades. Max. 0.5% grade break at BCR & ECR.
7. Absolute minimum ball around or away from curb returns shall be 0.4%. Vary curb face, if necessary. (Hold the T.C. elevations and vary the flowline.) (See 34)
8. Show profile going into and out of return with grades.
9. Check shoulders around curb returns for excessive slope (maximum 6%).
10. Label all grade lines and profiles. Also show size of curb face.
11. Show profile of existing centerline with elevations at least every 50 feet (except for projects involving mass grading).
12. Show profile of existing ground at property line (except for projects involving mass grading).
13. Show profile of existing E.P. with elevations at least every 50 feet.
14. Show connection with or future design to existing improvements along with existing elevations. Show grade on existing improvements with existing elevations to justify.
15. Grades of major and secondary streets should not exceed 6%. Residential streets should not exceed 15%.
16. Check elevations shown in profile against those shown in the plan view.
17. Check difference between T.C. and centerline against what typical section shows.
18. Minimum centerline and top of curb grade is 0.4%, show grades in profile. If profile on existing street is less than 0.4%, engineer to have prior approval from Public Works. No new streets to have grades less than 0.4%.
19. Use of vertical curves for all grade breaks in excess of 0.5% (Parabolic V.C.s only) Do not use portions of vertical curves.
20. Show tangent grades at PRVC or PCVC.
21. Show P.I. elevations on vertical curves.
22. Show elevations every 50 feet on vertical curves (or fractional part thereof).
23. Check sight distance: (both horizontal and vertical)  
Design speeds:           25 mph – residential streets  
                                  35 mph – secondary streets  
                                  45-55 mph – major streets
24. Show transition between different types/sizes of curbs.
25. Extend profiles beyond end of improvements, as necessary, to justify grades.
26. If future curb is to go over canal, etc., check to see there will be adequate clearance between bottom of curb and top of canal cover.
27. Use straight grades for cross gutters unless there are unusual circumstances.
28. Maximum 2.5% grade coming into cross gutter. P.I. for vertical curve to be minimum 50 feet back from flowline of cross gutter. On streets where the grade is 5% or greater, a grade of 4.5% into the cross gutter is acceptable.

**IMPROVEMENT PLAN CHECKLIST**  
**STREET AND STORM DRAIN IMPROVEMENTS**

Street and Storm Drain Profile  
Sheet 2 of 2

29. Check through streets for driveability.
30. Show structures to scale (catch basins, etc.). Note critical flowline elevations.
31. Show and label an existing or proposed underground construction that may conflict or enter into the design of the proposed improvements.
32. Show existing or proposed flow coming into and going out of new improvements.
33. Check for flat spots at high and low points of vertical curves. Vary curb face to provide min. flowline grade of 0.4% (vary the flowline, hold the T.C.). (See 34)
34. Use variable curb face on cul-de-sacs, knuckles, etc., to help alleviate flat slopes. Minimum flowline grade is 0.4%
35. If curbs are variable height, show T.C. and F.L. elevations and curb height. Show flowline profile with grade.
36. Check for car dragging going into driveway or alley.
37. On "grading to drain" situations, check for sufficient elevations and stations to allow grading to be done (critical where grading is to be done in flat area).
38. Proposed grade checked against City plans, if any.
39. All plans must be complete within themselves and not contingent on future or adjacent construction.
40. On curb inlets or outlets, the top of the curb remains constant with the flowline varying up or down to allow for the facility. Minimum flowline grade is 0.4%.
41. Where the property being developed is below the level of the street, a driveway profile is required to show that 100-year street flows will not enter onto private property by way of the driveway.
42. The pipe bedding case shall be specified per Standard Drawing No. 452.